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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PETER POSPICHAL
and JOSEPH D. RAINVILLE

Appeal 2009-002772
Application 10/765,815
Technology Center 1700

Decided: January 11, 2010

Before ALLEN R. MACDONALD, *Vice Chief Administrative Patent Judge*, TERRY J. OWENS, and MARK NAGUMO, *Administrative Patent Judges*.

NAGUMO, *Administrative Patent Judge*.

DECISION ON APPEAL

A. Introduction[1]

Peter Pospichal and Joseph D. Rainville ("Pospichal") timely appeal under 35 U.S.C. § 134(a) from the final rejection[2] of claims 1-6, 13, and 16-19.[3] We have jurisdiction under 35 U.S.C. § 6. We REVERSE.

The subject matter on appeal relates to a fuel cell system and a method of operating the system that prevents a turbo-machine type compressor from entering the "surge" condition, in which air flows backwards through the compressor due to excessive back-pressure in the fuel cell module. Turbo compressors are said to be low cost, low weight devices that operate "with low noise" compared to positive displacement compressors that are also used with fuel cell systems. (Spec. 2, ¶ [0006].) However, turbo-compressors, unlike positive displacement compressors, are said to be subject to damaging surge, or back-flow of gases due to back pressure from the fuel cell. (*Id.*) It is thus desirable, when using turbo-machine type compressors to provide gases to fuel cells, to avoid the surge condition.

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[1] Application 10/765,815, *Virtual Compressor Operational Parameter Measurement and Surge Detection in a Fuel Cell System*, filed 27 January 2004. The specification is referred to as the "815 Specification," and is cited as "Spec." The real party in interest is listed as General Motors Corporation. (Appeal Brief, filed 19 February 2008 ("Br."), 1.)

[2] Office action mailed 26 September 2007 ("Final Rejection"; cited as "FR").

[3] Copending claims 7-12, 14, 15, and 20 have been withdrawn from consideration and are not before us. (FR, cover sheet.)

Representative Claim 18 is reproduced from the Claims Appendix to the Principal Brief on Appeal:

> 18. A method for preventing a surge condition of a compressor in a fuel cell system, said method comprising:
>
> storing a compressor map of the compressor;
>
> driving the compressor at a desirable speed; and
>
> using the compressor map and the speed of the compressor to
>
> determine the location on the compressor map that the compressor is operating and
>
> *prevent the compressor from entering the surge condition.*

(Claims App., Br. 12; indentation, paragraphing, and emphasis added.)

The Examiner has maintained the following grounds of rejection:[4]

> A. Claims 18 and 19 stand rejected under 35 U.S.C. § 102(b) in view of Mitani.[5]
>
> B. Claims 1, 2, 4-6, 13, 16, and 17 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Mitani and Aramaki.[6]
>
> C. Claim 3 stands rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Mitani, Aramaki, and Stenersen.[7]

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[4] Examiner's Answer mailed 5 May 2008. ("Ans.").

[5] Hisashi Mitani et al., *Turbo Compressor System for Fuel Cell Generation*, JP 60-160574 A (1985). The Examiner relied on a Patent Abstracts of Japan abstract through the final rejection. Both Pospichal and the Examiner provided full translations with the Brief and the Answer, respectively.

[6] Kazuyoshi Aramaki, *Fuel Cell System*, U.S. Patent Application Publication US 2002/0039672 A1 (2002).

Pospichal contends that Mitani, rather than preventing the surge condition from happening, corrects an existing surge condition by opening a regulating valve that allows the system to return to non-surge operating conditions. (Br. 5, last full para.) As the remaining rejections for obviousness rely on additional references to meet other claim limitations, Pospichal argues that all of the rejections should be reversed. (Br. 7, 8.)

The Examiner maintains that Mitani teaches all of the steps recited in claim 18, including the step of preventing the compressor from entering the surge condition. (FR 2-3; Ans. 3, 6-7.)

B. Findings of Fact

Findings of fact throughout this Opinion are supported by a preponderance of the evidence of record.

The 815 Specification

1. According to the 815 Specification, a typical fuel cell stack receives gases as forced flows from a compressor. (Spec. 2, ¶ [0005].)

2. Turbo-machine type compressors are said to be low cost and low weight, and operate with low noise compared with positive displacement compressors that are sometimes used in fuel cell systems. (Spec. 2, ¶ [0006].)

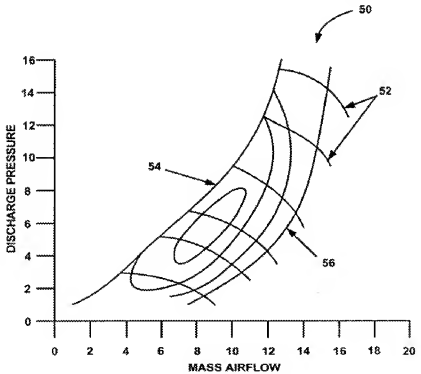
---

[7] Eivind Stenersen et al., *Filter Assembly for Intake Air of Fuel Cell*, U.S. Patent Application Publication US 2002/0150805 A1 (2002).

3. Turbo compressors, however, unlike positive displacement compressors (Spec. 3, ¶ [0008]), are said to be subject to "surge"—the reverse flow of gases through the compressor due to back pressure from the fuel cell stack (*id.* at 2, ¶ [0007]).

4. The surge condition is said to induce severe oscillations of airflow that can damage the compressor. (Spec. 3, ¶ [0008].)

5. The conditions under which surge occurs can be plotted on a "compressor map" 50, which is illustrated in Figure 1, reproduced below,



{Figure 1 is said to show a compressor map}

which presents discharge pressure from the turbo compressor on the vertical axis versus mass airflow on the horizontal axis.[8] (Spec. 2, ¶ [0007].)

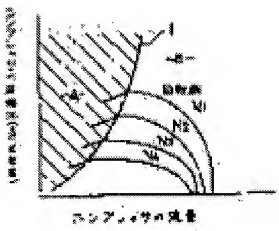
[8] For clarity, all labels of elements in Figures are presented in bold font, regardless of their presentation in the original document.

6. Speed lines 52 "show the relationship between airflow through the compressor and the discharge pressure of the compressor at various compressor speeds." (Spec. 2, ¶ [0007].)

7. The compressor map is bounded on the upper left by surge line 54, at and to the left of which "the compressor suffers from an audible flow reversion caused by excessive back-pressure" from the fuel cell stack. (Spec. 2, ¶ [0007].)

Mitani

8. Mitani describes a turbo-compressor system for fuel cell power generation with respect to a figure of a compressor map, shown below:



{Mitani Abstract Figure showing a compressor Map}

9. The Patent Abstracts of Japan abstract of Mitani (henceforth, "Mitani Abstract"), on which the Examiner relied through the Final Rejection, describes the surge prevention operation of the fuel cell system in the following words: "*when* the operating condition of the compressor 12 *comes*

in the area A where surging takes place, a flow rate regulating valve 18 is opened to the desired degree." (Mitani Abstract; emphasis added.)

10. "As the result," the Mitani Abstract continues, "part of the air discharged from the compressor 12 is led to the turbine via bypass line 17, and therefore the air flow rate passing through the compressor 12 increases and the operating condition of the compressor 12 *is returned to the regular operation area B* on the right side of a surge line 1, thus preventing effectively the generation of surging." (Mitani Abstract; emphasis added.)

C. Discussion

As the Appellant, Pospichal bears the procedural burden of showing harmful error in the Examiner's rejections. *See*, e.g., *Gechter v. Davidson*, 116 F.3d 1454, 1460 (Fed. Cir. 1997) ("[W]e expect that the Board's anticipation analysis be conducted on a limitation by limitation basis, with specific fact findings for each *contested* limitation and satisfactory explanations for such findings.") (emphasis added). To be anticipatory, a reference must describe, either expressly or inherently, each and every claim limitation. *E.g., In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009).

Claim 18 requires that the method "prevent the compressor from entering the surge condition."[9] The Mitani Abstract, however, clearly states that flow regulating valve 18 is opened "when the operating condition of the compressor 12 *comes in the area A where surging takes place*." (Mitani Abstract, penultimate sentence, emphasis added.) Thus, the process and

[9] Claims 1 and 13, which cover fuel cell systems configured to perform the corresponding method, have a corresponding limitation on the controller.

apparatus described by Mitani function by allowing the system to enter the surging region of the compressor map. Then, upon opening the flow rate regulating valve 18, "the air flow rate passing through the compressor 12 increases and the operating condition of the compressor 12 *is returned* to the regular operation area B on the right side of a surge line 1." (Mitani Abstract, last sentence, emphasis added.) In this light, the final clause of the Mitani Abstract, which states that the result of these steps is "preventing effectively the generation of surging," is most sensibly read as an awkward translation, rather than as a teaching that the compressor never crosses into region A, where surging takes place. The translations of Mitani provided by Pospichal with the Brief and by the Examiner with the Answer support the interpretation urged by Pospichal over the reading urged by the Examiner.

We conclude that the Examiner has failed to direct our attention to any credible evidence of record supporting the contention that Mitani, expressly or inherently, teaches a method or apparatus that does not allow a turbo-compressor in a fuel cell system to enter a surge condition, as required by claim 18. Accordingly, we REVERSE the rejection of claims 18 and 19 as anticipated by Mitani.

The Examiner relied on the other references as evidence of the obviousness of further limitations recited in the remaining appealed claims. Thus, the rejections for obviousness did not repair the defect in the principal rejection. Accordingly, we REVERSE the other rejections as well.

D. Order

We REVERSE the rejection of claims 18 and 19 under 35 U.S.C. § 102(b) in view of Mitani.

We REVERSE the rejection of claims 1, 2, 4-6, 13, 16, and 17 under 35 U.S.C. § 103(a) in view of the combined teachings of Mitani and Aramaki.

We REVERSE the rejection of claim 3 under 35 U.S.C. § 103(a) in view of the combined teachings of Mitani, Aramaki, and Stenersen.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

REVERSED

tc

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